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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
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EXAMINER	
AZARIAN, SEYED H	

ART UNIT	PAPER NUMBER
2627	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/683,621	ALYASSIN, ABDALMAJEID MUSA	
	Examiner	Art Unit	
	Seyed Azarian	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 December 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

RESPONSE TO AMENDMENT

1. Applicant's amendment filed, 12/13/2005, has been entered and made of record.

2. Applicant's arguments with regards to Claims 1-19 have been fully considered but they are not persuasive.

Applicant's argues in essence regarding claim 1, that Gosche does not teach, or suggest, "classification and /or segmentation can be done based on T2 relaxation times".

Contrary to the applicant's assertion, Gosche discloses (column 49, lines 50-54, provide a plurality of masked images of intracranial tissue, and classify the varying pixel intensities into separate grouping, also column 50, lines 39-43, data acquisition a spin-lattice "relaxation time (T1) data acquisition, and/or a spin-spin relaxation time (T2) data acquisition, also discloses, column 9, lines 27-41, that knowledge based rules refer to KGHID (knowledge-guided hyper intensity detection) that uses encoded knowledge of brain anatomy and MRI characteristics of individual tissues, the method requires no more than a segmentation of brain tissues, KGHID is able to identify sub cortical structures and hyper intense lesions using (based on) these tissue classes, also column 50, lines 37-48, refer to and/or (based) a spin-spin relaxation)).

In response to Applicant's argument regarding claim 1, that Gosche does not disclose "concurrent segmentation of MR images".

Gosche clearly discloses column 10, lines 39-49, imaging scan includes a plurality of consecutive imaging scans, the processor identifies a location of each cerebral region of at least one cerebral region in a successive imaging scan of the plurality of imaging scans based, determines a volumetric measurement for at least one of the cerebral regions).

However, for this feature, "concurrent segmentation examiner would like to point out that, claim call for "**substantially** concurrently" and using this reference, supplied with this action: Teboul (U.S. patent 5,709,206), column 43, lines 36-45, plurality of transaxial ductal ultrasound scan images over loungitudinal duct segment and the step concurrently display).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gosche invention according to the teaching of Teboul to utilize and provides imaging system which enables the physician or the medical technician to see entire ductal image.

Furthermore, in response to applicant's argument, regarding claim 1,that neither reference teaches use of "MIP for filtering".

The "location of MIP" is a broad limitation. The area encompassing bright spots in Fig. 3B that corresponds to the vessels are interpreted by the examiner as the location of Maximum Intensity Projection (MIP). Claim limitation does not require to identify the exact coordinate of the pixels depicting the MIP, also column 20, 53 through column 21, line 3) in Fig. 3d, does identify the location of the MIP in term of direction, (kOx or Equation).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Gosche to provides the location of the implemented MIP and achieve significant image enhancement.

Therefore the combination of Gosche with Udupa reads the claimed invention for identifying a spatial location of the MIP.

In response to applicant's argument that obviousness has not been established, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into

the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 8-9 and 11-16, are rejected under 35 U.S.C. 103(a) as being unpatentable over Gosche (U.S. patent 6,430,430) in view of Teboul (U.S. patent 5,709,206).

Regarding claim 1, Gosche discloses an automatic method for segmenting magnetic resonance (MR) images of an anatomical body of interest comprising (column 17, line 65 through column 18, line 12, providing a magnetic resonance image, identifying a brain area within each slice to provide a plurality of masked images and applying a segmentation technique);

classifying a plurality of selected structures within the body of interest based on a plurality of image processing computations relating respective T2 relaxation times corresponding to each of the structures (column 49, lines 50-54, provide a plurality of masked images of intracranial tissue, and classify the varying pixel intensities into separate grouping, also column

50, lines 39-43, data acquisition a spin-lattice "relaxation time (T1) data acquisition, and/or a spin-spin relaxation time (T2) data acquisition);

segmenting the MR images for each of the structures substantially concurrently based on the plurality of image computations (column 10, lines 39-49, imaging scan includes a plurality of consecutive imaging scans, the processor identifies a location of each cerebral region of at least one cerebral region in a successive imaging scan of the plurality of imaging scans based, determines a volumetric measurement for at least one of the cerebral regions).

However regarding claim 1, Gosche does not explicitly state, "concurrent segmentation of MR images". On the other hand Teboul in same field of medical diagnostic systems teaches, plurality of transaxial ductal ultrasound scan images over loungitudinal duct segment and the step concurrently display).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gosche invention according to the teaching of Teboul to utilize and provides imaging system which enables the physician or the medical technician to see entire ductal image.

Regarding claim 2, Gosche discloses the method of claim 1 wherein the anatomical body of interest is the brain and the plurality of structures include at least one of air, face tissue, brain tissue, cerebrospinal fluid (CSF), edema and tumor tissue (column 18, lines 20-41, magnetic resonance image includes a multi spectral data set the pixel intensities are at least four tissue types; type 1 comprises cerebrospinal fluid, type 2 comprises white matter, type 3 comprises gray matter and type 4 white matter hyperintensities).

Regarding claim 3, Gosche discloses the method of claim 1 wherein the segmenting step is used in at least one of diagnosis, volume measurement and clinical research (column 51, lines 55-61, after imaging scans have been processed the results are total intracranial volume, ventricular volume, total CSF volume, sulcal CSF volume, white matter and gray matter volume measurements, also column 19, lines 9-18, can create a diagnostic tool to indicate the likelihood of lesions and the algorithm can be enhanced by incorporating a database to capture past and present measures, therefore becoming useful in serial studies and clinical research, also column 51, lines 55-61, refer to volumetric measurement of each detected cerebral region).

Regarding claim 4, Gosche discloses the method of claim 4 wherein the MR images are acquired by dual pulse echo sequence (column 20 lines 7-10 and column 20 lines 51-55, the multi spectral MRI dataset for each brain slice consist of proton density weighted (1^{st} echo) and T2 weighted acquisitions (2nd echo) (both types of acquisition are used, hence duel echo acquisition)).

Regarding claim 11, Gosche discloses the method of claim 8 wherein the segmenting step is used in at least one of diagnosis, volume measurement and clinical research (column 51, lines 55-61, refer to volumetric measurement of each detected cerebral region).

Regarding claim 12, Gosche discloses a system for automatically segmenting magnetic resonance (MR) images of an anatomical body of interest comprising: a processor coupled to an MR image acquisition device, the processor being adapted to perform concurrent segmentation computations for a plurality of selected structures within the anatomical body of interest; and, an interface unit coupled to the processor adapted to present information relating to the segmented computations corresponding to the plurality of selected structures. (See claim 1, also column 11,

line 50 through column 12, line 9, refers to the processor and the apparatus (unit) for interpreting the images).

Regarding claim 16, Gosche discloses the system of claim 15 wherein the dual echo pulse sequence comprises a first echo being a proton weighted density echo and a second echo being a T2 weighted echo (column 20 lines 7-10 and column 20 lines 51-55, the multispectral MRI dataset for each brain slice consist of proton density weighted (1st echo) and T2 weighted acquisitions (2nd echo) (both types of acquisition are used, hence duel echo acquisition));

identifying a spatial location of the implemented MIP wherein the spatial location is then used to extract values from subsequent echoes (column 39, lines 35-61, uses a logarithmic transformation of the gray values of the PDW slice to effect a better separation of the dark background pixels from the brighter pixels of the imaged head, once each pixel in the raw PDW is replaced by its natural logarithm, the image is thresholded by retaining only those pixels that constitute the top 30% of the intensities in this image. The image is then thresholded so that the lowest 30% is set to zero. Then the resulting dilation is applied as a multiplicative mask to the original multispectral image set (PDw, T2w, and T1w)).

Regarding claims 5, 8 and 9, it recites similar limitation as claims 1 and 4 are similarly analyzed.

Regarding claims 13 and 14, it recites similar limitation as claims 2 and 3 are similarly analyzed.

Regarding claim 15, it recites similar limitation as claim 4 is similarly analyzed.

4. Claims 6-7, 10 and 17-19, are rejected under 35 U.S.C. 103(a) as being unpatentable over Gosche (U.S. patent 6,430,430) in view of Udupa et al (U.S. patent 5,812,691).

Regarding claim 6, Gosche discloses at least one radial histogram, and a plurality of image processing filters (column 19, lines 1-4, refer to histogram and incorporating the anisotropic filter).

However regarding claim 6, Gosche does not explicitly state, "comprises a scatter plot of voxel values of the MR images" although it is stated that advancements in knowledge-guided algorithms can contribute to increased scientific knowledge of disease and aid the clinician in early detection. On the other hand Udupa in same field of medical diagnostic systems teaches that the clustering step of dividing the digital representation of the MR image slice in a scatter plot into segments, can produce a cluster representing white matter, gray matter, and cerebrospinal fluid (Fig. 7, column 22, lines 48-66)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gosche invention according to the teaching of Udupa to utilize the scatter plot of voxel values and enhance multispectral data used in segmenting magnetic resonance images, which can easily be implemented in diagnostic device such as MRI system.

Regarding claim 7, Gosche discloses the method of claim 6 wherein the image processing filters are adapted to enhance T2 values of the MR images and further relate dual echo image information (column 19, lines 1-6, incorporating the anisotropic filter may increase the robustness of the algorithm).

Regarding claim 17, Gosche does not explicitly state, "implementing a maximum intensity projection (MIP) ". On the other hand Udupa in same field of medical diagnostic systems teaches a popular method of visualizing the vessels in this application is via 3D renditions created by maximum intensity projection (MIP) (column 20, lines 39-53).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gosche invention according to the teaching of Udupa because it provides a useful tool for image data as characteristic intensity patterns to achieve significant accuracy, which satisfies the claim requirements.

Regarding claims 10 and 19, it recites similar limitation as claims 6 and 7 are similarly analyzed.

Regarding claim 18, it recites similar limitation as claim 5 is similarly analyzed.

Conclusion

5. **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Azarian whose telephone number is (571) 272-7443. The examiner can normally be reached on Monday through Thursday from 6:00 a.m. to 7:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached at (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR.
Status information about the PAIR system, see http:// pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Seyed Azarian

Patent Examiner

Group Art Unit 2627

February 7, 2006

JINGGE WU
PRIMARY EXAMINER